LVII.—*Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander Alfred Carpenter, R.N., D.S.O., commanding.*—No. 13. *On the Bathybial Fishes of the Bay of Bengal and neighbouring waters, obtained during the seasons* 1885–1889. By Alfred Alcock, M.B., Surgeon-Naturalist to the Survey.

[Concluded from p. 399.]

Family **Scopelidæ**.

Bathypterois, Gthr.

Bathypterois Guentheri, sp. nov.

B. 12. D. 13. A. 11. P. 2/6/5. V. 8. C. 20.
L. lat. circ. 55. L. tr. $\frac{7}{8}$.

Body elongate and compressed, its height nearly one sixth of the total, without caudal. Head contained nearly three and a half times in the same measure; depressed, flat-crowned, as broad as deep. Snout broad, depressed, rounded, duck-bill shaped, with a median intermaxillary notch, into which a strong recurved projection of the very prominent mandible fits; its length one third that of the head; its surface with numerous large pores. A wide mucous channel with a line of large pores along the under surface of the broad mandibles. Eyes minute, situated near the vertical middle of the maxilla, close to its edge, a snout-length apart; the orbital margins rounded and inflated. Interorbital space flat from side to side. Nostrils small, superior, far in advance of the eye. Cleft of mouth extremely wide, slightly oblique; the maxilla, which has a dilated, abruptly-truncated, hinder end, is nearly two thirds the head-length. Villiform teeth in broad bands on the outer edges of the strong jaw-bones, and in a minute patch on each side of the expanded vomer. Gill-cleft reaching to the fore end of the isthmus; gill-laminæ broadish; gill-rakers numerous, close-set, long, bristle-like, except on the fourth arch. Body and head, except the jaws and front part of the vertex of the snout, covered with large, thin, smooth scales, those on the sides of the head rather deciduous, those on its crown enlarged. The caudal and paired fins with one or more extremely stout, rigid, prolonged rays; the interradial membrane of all the fins except the caudal covered with a thick, black, velvety, deciduous integument. The dorsal begins a little in advance of the vertical middle line,

and is just entirely in advance of the anal, the two fins being of nearly equal extent and height. A thin, narrow, adipose dorsal in the posterior half of the tail. Caudal large and deeply forked; its lowermost ray rigid, prolonged, curved, with a spatulate tip, the total length of the ray from base to tip being nearly two thirds of the total (caudal excluded). The pectoral consists of three distinct portions:—(1) an upper, of two detached, produced, rigid rays, the first of which, though broken, reaches to the tip of the upper lobe of the caudal and is simple throughout, while the second is about half the length of the first; (2) a middle portion of six comparatively short branched rays, diminishing from above downwards, connected together by a stout interradial membrane; and (3) a lower portion of five free, simple, elongated rays, which reach halfway along the tail. The ventrals arise just in front of the dorsal; the two outermost rays of each fin are inseparably united throughout their extent to form a long, curved, rigid, spatulate appendage, between one fifth and one sixth longer than the elongated lower caudal ray, which reaches to the vertical from the tip of the upper caudal lobe.

Colours in spirit:—Head nearly black; body dark brown, with two broad, transverse, white bands, one just in front of the dorsal fin, the other near the middle of the tail; caudal white; the other fins black, except their prolonged rays, which are translucent white, with black tips. A large, opaque-white, digitate body shows through the bones of the crown of the head and snout, and there is a similar linear body along the mucous canal of the mandible.

One specimen, a female with gravid ovaries, 10 inches long (prolonged caudal ray excluded).

Hab. Andaman Sea, $7\frac{1}{2}$ miles east of North Cinque Island, 490 fathoms.

I beg to name this species after Dr. Albert Günther, F.R.S., to whose monumental works all students of ichthyology must ever remain grateful debtors.

Family **Stomiatidæ**.

Stomias, Cuv.

Stomias nebulosus, sp. nov.

D. 17. A. 21. P. 6. V. 5.

Near *Stomias affinis*.

Head-length one ninth of the total. Body compressed, its height one twelfth of the total. Snout shorter than the large

eye. Cleft of mouth oblique, enormous; the limbs of the mandibles widely distensible. Teeth fixed, upwards of twenty-five small, unequal, and curved in each premaxilla, and about the same number, in the form of minute, close-set, down-curved, even serrations, in each maxilla; a fang on each side of the vomer; one or two moderate-sized teeth in the palatines. The teeth of the lower jaw are very large, curved and acute, and stand out laterally, eight or nine on each side, almost at right angles outside the mouth. Barbel about as long as the head and ending in three longish filaments. The bony part of the opercle is reduced to a small preoperculum. The surface of the body is covered with a tenacious slime. There are no scales, but the body is mapped with regular rows of hexagonal depressions, each with a minute central white point. Median line of the abdomen, from throat to anal fin, occupied by a salient white line, which is resolved by the lens into a linear cloud of thick-set white specks. On each side of this are two rows of enlarged luminous organs, the inner extending from the isthmus to the base of the caudal and numbering 64 (to base of pectoral 6, to base of ventral 40, to origin of anal 49, to base of caudal 64), the outer from the base of the pectoral to the origin of the anal and numbering 35. The dorsal fin begins in the last fifth of the body, a little in rear of the commencement of the anal, which is also the deeper. Caudal not forked. The pectorals arise on very narrow bases near the ventral profile; their length is equal to the height of the body. The ventrals are also narrow and are exceedingly prolonged, reaching beyond the origin of the anal.

Colours in spirit:—Uniform black; fins and barbel white, with black tips.

Two specimens, rather mutilated, the longer $3\frac{1}{2}$ inches.

Hab. Gulf of Manaar, lat. 6° 29′ N., long. 79° 34′ E., 597 fathoms.

Malacosteus, Ayres.

Malacosteus indicus, Gthr.

Malacosteus indicus, Günther, Ann. & Mag. Nat. Hist. 1878, vol. ii. p. 181; Zool. Chall. Exp. vol. xxii. p. 214, pl. liv. fig. B.

Hab. Andaman Sea, off Cinque Island, 650 fathoms.

Family **Alepocephalidæ**.

Bathytroctes, Gthr.

Bathytroctes microlepis, Gthr.

Bathytroctes microlepis, Günther, Ann. & Mag. Nat. Hist. 1878, vol. ii. p. 249; Zool. Chall. Exp. vol. xxii. pp. 226, 227, pl. lvii. fig. A.

A specimen, very badly mutilated and not unequivocally identifiable, from the Andaman Sea, 8 miles south-east of Cinque Island, in 500 fathoms.

Family **Halosauridæ**.

Halosaurus, Johnson.

Halosaurus anguilliformis, sp. nov.

B. 12. D. 12. P. 12. V. 9. L. tr. $\frac{12}{2}$.

All the tissues fragile. Head long, its length exceeding the distance between the gill-opening and the base of the ventral fins. Body subcylindrical, its height being but two thirds the length of the snout, which is half that of the head measured to the end of the occiput. Snout tapering, produced just half its length beyond the mouth. Suboperculum very large; the whole opercle covered with a thin, tough, whitish membrane, which roofs over two very wide, parallel, muciferous channels, which extend, one from the preorbital to behind the eye, the other from the symphysis of the lower jaw to the hinder edge of the suboperculum. Diameter of the eye two fifths the length of the postocular portion of the head and exceeding the width of the flat interorbital space. The nostrils are small perforations immediately before the front angle of the eye. Mouth inferior; the maxilla barely reaches the vertical from the front margin of the orbit. Teeth in broad villiform bands in the jaws and hyoid, in a crescentic band on the palatines, and in narrow tapering bands on the pterygoids. Gill-openings wide; gill-membranes entirely separate; four gills, with narrow laminæ; fourteen gill-rakers on the first arch, of which the middle ones are long and bacillate. Body covered with large cycloid scales; head, excepting the cheeks and upper part of opercles, scaleless. The scales of the lateral line are a little enlarged, being rather over a quarter of an inch in diameter and perforated in the centre. The lateral line shows as an opaque white cord curving abruptly downwards from the base of the pectoral fin to the lower profile of the body, along which it runs. Dorsal and anal fins with scaly bases. Pectorals arising well above the middle line of the body, long and narrow, reaching nearly to the base of the ventrals.

Colours in spirit:—Pinkish brown, opercles and cheeks silvery, gill-membranes black; fins light grey, posterior part of anal black. Some bright opaque-white masses show through the bones of the vertex of the head; a large sagitti-

form one, followed by a small circular one, in the middle line; a large circular one behind two converging cuneiform ones in each temporal region.

Length 14 inches.

Two specimens, females with gravid ovaries, both in fragments.

Hab. Gulf of Manaar, lat. 6° 32′ N., long. 79° 37′ E., in 675 fathoms.

Halosaurichthys, gen. nov.

Differing from *Halosaurus* in possessing a long rudimentary second dorsal fin and in having the ventrals united into a broad flat plate.

Halosaurichthys carinicauda, sp. nov.

B. 13. D. 11. P. 15. V. 10. L. tr. $\frac{14}{5}$.

Head short, its length being $7\frac{1}{3}$ in the total and tapering from the broad branchial region to the pointed snout. Body long, low, and somewhat compressed, its greatest height being equal to the length of the postocular portion of the head. Tail long and tapering. Snout overhanging the mouth, its length three times that of the eye or of its preoral portion. Preoperculum small; suboperculum much larger than the operculum. Two parallel, wide, mucous channels, closed over by a thin, tough, white membrane, extend, one from the preorbital to the front limit of the operculum, the other from the mandibular symphysis to the hinder edge of the suboperculum. Eyes lateral, small, their major diameter $3\frac{2}{3}$ in the postocular portion of the head and greater than the width of the interorbital space. Nostrils large, the anterior separated from the posterior by a broad, black, outstanding loop of skin. Mouth narrow; the maxilla not reaching to the vertical from the front margin of the orbit. Villiform teeth in broad bands in the jaws and hyoid, forming a broad crescent in the prominent loose palatines and a short narrow band in the pterygoids. Gill-membranes entirely separate; four gills; first branchial arch with some rather long bacillate gill-rakers. Head covered everywhere, including the glossohyal region, with small or minute adherent scales. Body with large, thin, rather deciduous, cycloid scales, not larger along the lateral line than elsewhere. Small scales on the lower half of the dorsal fin and along the extreme base of the anal. The lateral line shows as an indistinct opaque white thread. Dorsal fin short, arising just behind the origin of the ventrals.

The posterior half of the interval between this fin and the tip of the tail is crested by a low median fold of skin (not much more than half a millimetre high after contraction in spirit), enclosing distant, thin, sharp, irregular indurations. Between this second rudimentary dorsal and the first dorsal is a median erectile scale a little longer than the eye. The anal fin arises a little in advance of the vertical middle of the body and is continued to the tip of the tail. The pectorals, which arise on narrow bases above the horizontal middle of the body, reach barely halfway to the origin of the ventrals. These, which arise exactly halfway between the gill-openings and the vent, are united together into a broad plate.

Colours in spirit:—Pinkish brown; fins grey; opercles and gill-membranes black.

Stomach short, cæcal; intestine straight, wide; both invested throughout with black peritoneum; a few minute, rudimentary, pyloric cæca. The liver embraces the œsophagus; its left lobe large, its right extremely small. The generative glands form an elongated series of almost independent lobules on each side. The air-bladder is an elongated thick-walled nacreous sack, occupying the greater part of the length of the abdominal cavity and ending abruptly in front in a fine cord, which is firmly attached to the dorsal surface of the œsophagus.

Total length 15½ inches.

One specimen.

Hab. Andaman Sea, 7½ miles east of North Cinque Island, in 490 fathoms.

The dorsally-keeled tail with its indurations, the united ventrals, and the loose palatine bones, all coexisting in one fish suggest an alliance in the direction of *Notacanthus*.

Family **Murænidæ**.

Group *Anguillina*.

Congromuræna, Kaup.

Congromuræna longicauda, sp. nov.

Head tapering in both dimensions from the gill-cleft to the fleshy, blunt-pointed, projecting snout. Trunk an eye-length longer than the head, one third higher immediately behind the gill-opening than at the anal level, with a hog-back dorsal and an inflated abdominal curve. Tail nearly twice the length of the united head and trunk, compressed and gently tapering. Eye large, circular, more than half the

length of the snout. Nostrils very large, the anterior a wide short tube at the end of the snout, the posterior situated in front of the upper half of the eye. Head with wide mucous channels, which communicate with the exterior by large open pores; one such channel with five pores along each upper lip, one with ten pores extending from the mandibular symphysis to the operculum on each side, and one along each side of the top of the head ending in two very wide pores on each side of the snout. Two small pores at the base of the snout just outside the mouth. Cleft of mouth horizontal and reaching just beyond the middle of the eye; the upper jaw far overhung by the snout and overhanging the lower. Tongue long, pointed, fleshy, free. Teeth minute, in rather broad bands in the jaws, and in a broad patch outside the mouth in the expanded premaxillæ; a few small teeth in the vomer, quite anteriorly. Gill-openings narrow, widely separated; a broad fold of skin extends to the base of the pectoral from their anterior margins. No scales. A row of close-set pores extends throughout the whole length of the lateral line. Pectorals narrow, a little longer than the snout. Vertical fins confluent; the dorsal begins above the gill-opening.

Colours in spirit:—Transparent grey, with minute black specks.

Total length 16 inches.

Hab. Andaman Sea, south-east by south of Ross Island, in 265 fathoms.

Coloconger, gen. nov.

Allied to *Conger*.

Snout and tail very short. Muscular and osseous systems well developed. Four gills, which communicate with the pharynx by wide slits. Gill-openings separate. Heart situated immediately behind the gills. Eyes large. Posterior nostril superior. Cleft of mouth wide, extending beyond the middle of the eye. Tongue free. Teeth in a single continuous ridge in each jaw, none on the vomer. No scales. Vertical fins well developed, confluent; the dorsal begins above the root of the pectoral. Pectorals well developed.

Coloconger raniceps, sp. nov.

Head broad, massive, frog-like; its length measured to the gill-opening a little more than twice its breadth and one fifth of the total. Trunk deep, its length, which exactly equals that of the short, compressed, abruptly-pointed tail, is three

times its height; abdomen large and full. Snout blunt, hardly advanced, its surface studded with pin-hole pores; its breadth nearly twice its length, which is but three fourths of that of the eye. Eyes large, nearly circular, prominent, their major diameter a little less than one fourth the length of the head measured to the gill-opening. Nostrils large, the anterior subtubular, the posterior above the angle of the eye. Mouth cavernous. Jaws slender, equal. Tongue short, broad, fleshy, free in its anterior third. In each jaw a row of small uniform teeth in continuous contact, except at their extreme tips, which show as minute recurved asperities on a sharp-edged ridge. No vomerine teeth. A large, oval, horny, granular plate in the fauces behind the superior pharyngeal bones. A mucous channel with numerous pores along the lower jaw beneath. Gill-laminæ narrow; gill-openings of moderate size, a broad fold extends from their outer edge to the base of the pectoral fin. No scales. Head with numerous black tubular papillæ. Lateral line a salient tube, with upwards of a hundred similar papillæ. Vertical fins confluent; the dorsal, which begins above the base of the pectoral, is considerably higher than the anal. Pectorals two fifths of the length of the head.

Colours in spirit:—Uniform yellow-brown; abdomen speckled with black, due to the peritoneal pigment showing through.

Visceral peritoneum black. Stomach with a cæcum half as long as the body-cavity. Intestine sinuous. Only the left lobe of the liver developed. Air-bladder large, globular.

Length $6\frac{1}{2}$ to $10\frac{1}{2}$ inches.

Hab. Andaman Sea, off Ross Island, in from 265 to 271 fathoms.

Group? Allied to *Muræsocina*.

Sauromuræsox, gen. nov.

Form of the body widely departing from the typical, the trunk being high and well marked off from the head and tail, which is a long tapering appendage. Tissues well developed. Gills four, opening into the pharynx by wide slits; gill-openings separate. Heart situated immediately behind the gills. Nostrils lateral. Eye large. Tongue free. Vertical fins ill developed, confluent; the dorsal begins in front of the level of the gill-opening. Pectoral fins well developed. No scales. Snout long, pointed. Cleft of mouth extending far behind the eye; the upper jaw overlapping the lower. One

complete row of teeth in each jaw and a second incomplete row in the maxilla; premaxillary teeth and those at the mandibulary symphysis fang-like; a single row of large fangs in the vomer.

Sauromuræsox vorax, sp. nov.

General form of the body much like that of a chameleon. The length of the head measured to the gill-opening is about $4\frac{2}{5}$ in the total; its branchiostegal region is extremely deep and wide, its anterior half is contracted and tapers to the long, narrow, sharp-pointed snout. The trunk, the length of which is two thirds that of the tail, is high and compressed, with a nearly straight abdominal and a very strongly convex dorsal profile; it is conspicuously constricted off from both head and tail, its height at the middle being more than twice its height at the anal level and about one ninth of the total length. The tail is slightly compressed, tapers to a fine point, and has the appearance of a mere appendage of the trunk; its length is one half the total, excluding the snout and eye. The length of the snout is twice the width of the interorbital space and more than twice the diameter of the large circular eye; it tapers to a fine point, which is slightly hooked. Nostrils large, the anterior subtubular, at some distance from the tip of the snout; the posterior in front of the middle of the eye. Cleft of mouth wide, extending an eye-length behind the posterior border of the orbit; the upper jaw overlapping the lower. Tongue free, bicylindrical, truncated. In maxillæ and mandibles a single row of close-set, equal, acute teeth of moderate size; also in the former an inner incomplete series of similar teeth, and in the latter at their symphysis three pairs of canine teeth, the middle of which are very large, and fit when the mouth is closed into a notch between the maxillaries and premaxillaries; four large equal canines in a row in the vomer; premaxillæ with three smaller canines, which project when the mouth is closed. Gill-openings wide, extending obliquely from the upper border of the base of the pectoral fins to near the middle line of the abdomen; a broad flap of skin connects their anterior margin with the base of the pectoral fin; gill-laminæ broad. Integument thin, without scales. Lateral line follows the dorsal curve and ends in the posterior half of the tail; it is perforated throughout with pores. Vertical fins, especially the anal, feebly developed, confluent; the dorsal begins considerably in advance of the gill-opening, the anal behind a very large abdominal pore. Pectorals longer than the snout.

Colours in life :—" Head and dorsum pale chocolate ; venter pale silvery slate " (*Dr. G. M. Giles*). In spirit vertical fins transparent white ; pectorals dark brown, edged with light grey.

One specimen, a female 14 inches long, with gravid ovaries.

Hab. Bay of Bengal, lat. 20° 17′ 30″ N., long. 88° 51′ E., in 193 fathoms.

Group ? Allied to *Saccopharyngina*.

Dysomma, gen. nov.

Soft tissues well developed ; osseous tissues weak. Body high anteriorly and the head much inflated. Tail tapering to a point. Vent situated immediately behind the gill-opening. Snout short, slightly overhanging the mouth, its surface with many pores. Eyes minute, concealed beneath the skin. Nostrils large, lateral. Cleft of mouth wide. Minute sharp teeth in a single row in each jaw ; a row of larger teeth in the vomer. Tongue not free. Four gills, communicating with the pharynx by wide slits. Osseous elements of the gill-cover rudimentary or absent. Gill-openings separate. Head situated between the gills. No scales. Vertical fins fairly developed, the dorsal beginning just behind the occiput. Pectorals well developed.

Dysomma bucephalus, sp. nov.

Head posteriorly deep and much inflated, its length measured to the gill-opening nearly one fourth of the total. Vent situated with the abdominal pore on a large, round, fleshy clitellum immediately behind the gill-opening. Height of the body at the anal level 10½ in the total, and gradually diminishing to a point at the tip of the tail.

Snout short, about one sixth the length of the head measured to the gill-opening, broad, depressed, rounded, it and the cheeks studded with minute pores. Eyes minute, their diameter about one fifth the length of the snout, concealed beneath semitransparent, partly pigmented skin. Nostrils large, the anterior tubular, situated near the tip of the snout, the posterior valvular, almost on the eye. Mouth wide ; jaws weak ; lips inflated, each with several rows of small pores. Teeth minute, sharp, in a single row in both jaws, in a single short row, rather larger, in the vomer. Tongue not free. The gill-covers are formed of a tough skin, in which neither bony opercles nor branchiostegal rays are

apparent; the branchial arches are weak and flexible, the gill-laminæ broad and cut square; gill-openings of moderate size. No scales. Lateral line in the form of a row of pores following the dorsal curve. Vertical fins fairly developed; the dorsal begins immediately behind the occiput and the anal immediately behind the fleshy anal clitellum. Pectorals longer than the snout, rounded.

Colours in life:—"Head and dorsum pale chocolate; venter silvery slate" (*Dr. G. M. Giles*). In spirit vertical fins white, lower half of the end of the tail black.

Body-cavity extending far behind the vent, more than halfway along the tail, lined with silvery peritoneum, speckled with black pigment. Visceral peritoneum colourless. Stomach cæcal, nearly half the length of the body-cavity; the pyloric and œsophageal openings almost on the same level. Intestine forming a long loop, the convexity of which reaches to the extreme hinder end of the body-cavity. Air-bladder thick-walled, nacreous, trilobed, with a large central and two small lateral lobes, the narrow, thread-like, œsophageal duct springing from the end of one of these. Only the left lobe of the liver developed.

One specimen, a female with gravid ovaries, $8\frac{3}{4}$ inches long.

Hab. Bay of Bengal, lat. 20° 17′ 30″ N., long. 88° 51′ E., in 193 fathoms.

Group *Nemichthyina*.

Gavialiceps, gen. nov., Wood-Mason, MS.

Differing from *Nemichthys* in having the eyes small and in wanting pectoral fins.

Gavialiceps tæniola, sp. nov., Wood-Mason, MS.

Body narrow, compressed, ending in a long lash-like tail. Head depressed. Snout in the form of a stout spathulate beak, formed by the jaws and the prolongation beyond them of the vomer; the upper segment of the beak overlapping the lower. Two rows of small sharp teeth in each jaw, continued up to the end of the beak, and a long row, extending the whole length of the beak, of larger distant teeth in the vomer. Eyes in diameter about one sixth the snout-length, situated in advance of the angle of the mouth. Gill-openings separate, extending nearly to the middle line of the abdomen. Vent situated about a head-length and three quarters behind

the gill-opening. No scales. Vertical fins confluent; the dorsal begins about a snout-length behind the occiput. No pectorals.

Colours in life:—"Silvery; iris black" (*Wood-Mason*).

Maximum length 10½ inches.

Four specimens.

Hab. Bay of Bengal, lat. 19° 35′ N., long. 92° 24′ E., in 272 fathoms; Andaman Sea, 7 miles south-east by south of Ross Island, in 265 fathoms.

Gavialiceps microps, sp. nov.

Body cylindrical; tail long and pointed, but not tapering. Vent situated about a snout-length behind the gill-opening. Snout in the form of a long, rigid, needle-pointed beak, with a stout pyramidal base, formed by the jaws and vomer; the upper segment slightly projecting. Upper jaw serrated; a row of slightly recurved teeth in the lower jaw; on the vomer, which forms the anterior third of the upper segment of the beak, a single prolonged row of long teeth posteriorly and a cluster of minute asperities anteriorly. Eyes minute, situated before the angle of the mouth. Two minute nostrils in a triangular depression in front of the eye. No scales. Vertical fins confluent; the dorsal beginning about two snout-lengths behind the gill-opening. No pectorals.

Colours in spirit:—Grey-brown, belly yellowish; branchiostegal region and base of beak superiorly black.

One specimen, 10½ inches long, very much injured.

Hab. Bay of Bengal, west of the Ten Degree Channel (between the Andamans and Nicobars), in 1045 fathoms.

In conclusion, I have to record my deep obligations to Professor Wood-Mason, of the Indian Museum, who himself collected the larger number of these fishes. In field-work Professor Wood-Mason has, with the most unceasing kindness, aided me with his unrivalled Indian experience; while in the museum and library his advice has been more to me than I can express.

I must also acknowledge my indebtedness to Dr. Günther's work on the 'Challenger' deep-sea fishes, without which I could have made no progress.